1 About this minor change

1.1 Why I wrote it

I wrote this Minor Change, because I could not find any Pilatus B4 gliders with a documented installation of a transponder. With lots of support from many gliding friends(thanks!), I wrote the document. It was sent by EASA to the Dutch authorities, who asked me to specify which transponders and antennae the Minor Change should apply to. After I supplied a list, the Minor Change was approved.

1.2 Usage

Everybody who wants to use this minor change, may do so. Feel free to spread the complete PDF, including this page please, any way you like as long as its free of charge. I intend to spread the document to Pilatus, EWMS, Garrecht, Funkwerk, and a bunch of newsgroups/forums/etc I know of.

Using this minor change does not cost you anything. Applying for this minor change cost me 290 euros (which I had to pay to EASA), plus many hours creating the document, sending it, and responding to questions. Therefore, you are welcome to contact me, should you wish to compensate me for my efforts. Also, you are encouraged to share your work as well.

1.3 Technical note

Please mind the risk of contact-corrosion when installing the antenna. The copper can cause contact-corrosion with the aluminum skin of the glider.

1.4 Expanding

Should you want to expand upon this Minor Change, then you can grab the source document (written in LaTeX, built using make on Linux), change what you like and apply for a new minor change at EASA. Applying at EASA will cost you the full 290 euros Im afraid. The complete source is available here: https://github.com/roeles/minor_change_transponder Naturally I am also willing to help you convert this document into other formats for editing.

1.5 Contact

Should you have any questions, feel free to contact me.

Roel Baardman
roel.baardman@gmail.com

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European Aviation Safety Agency

MINOR CHANGE APPROVAL

10049762

This Minor Change Approval is issued by EASA, acting in accordance with Regulation (EC) No. 216/2008 on behalf of the European Community, its Member States and of the European third countries that participate in the activities of EASA under Article 66 of that Regulation and in accordance with Commission Regulation (EC) No. 748/2012 to

BAARDMAN, ROEL

[redacted]

and certifies that the change in the type design for the product listed below with the limitations and conditions specified meets the applicable Type Certification Basis and environmental protection requirements when operated within the conditions and limitations specified below:

Original Type Certificate Number : SWITZERLAND S 43-02
Type Certificate Holder : PILATUS AIRCRAFT LTD.
Type Design - Model : B4-PC11
B4-PC11A
B4-PC11AF

Description of Design Change:
Installation of a Garrecht VT01 Ultracompact or Funkwerk Avionics TRT800H transponder and a Filser Transflex-4 antenne in the B4-PC11 glider

EASA Certification Basis:
The Certification Basis (CB) for the original product remains applicable to this certificate/ approval. The requirements for environmental protection and the associated certified noise and/ or emissions levels of the original product are unchanged and remain applicable to this certificate/ approval.

See Continuation Sheet(s)

For the European Aviation Safety Agency,

Date of issue: 04 July 2014

European Aviation Safety Agency
Carl Thomas
Certification Manager General Aviation

Note:
The following numbers are listed on the certificate:
EASA current Project Number: 0060038722-001

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Associated Technical Documentation:
Installation Manual reference:
Garrecht Avionik VT-01 Installation Manual 01.0200.11E
Funkwerk Installation Manual TRT800 03.2124.010.71e

Other technical documentation:
Description of change: document "minorchange 23-06-2014

Limitations/Conditions:
None.

- end -

Note:
The following numbers are listed on the certificate:
EASA current Project Number: 0060038722-001

MINOR CHANGE APPROVAL - 10049762 - BAARDMAN, ROEL

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Minor Change

1 Change design description

Design title: Installation of a transponder and antenna in a Pilatus PC11-B4 glider.

2 Aircraft identification

Aircraft type	Serial Number
Pilatus PC11-B4	All
Pilatus PC11-B4A	All
Pilatus PC11-B4AF	All

3 Design summary

This change is for the installation of an ETSO-2C112-approved Mode-S transponder (like for example the Garrecht VT-01 UltraCompact) with an approved compatible antenna (for example the Filser Transflex-4 antenna) in the applicable aircraft. The design change covers the installation of an antenna, a transponder and associated wiring. This change is identical for all aircraft identified in section 2.

4 Minor/Major classification

This change has no significant effect on the mass, balance, structural strength, reliability, operational characteristics, noise, fuel venting, exhaust emission, or other characteristics affecting the airworthiness of this product. Therefore, this change can be considered Minor.

5 Applicable requirements

5.1 CS 22.1301: Equipment/Function and installation

(a) Each item of required equipment must:

(1) be of a kind and design appropriate to its intended function;

(2) be labelled as to its identification, function, or operating limitations, or any applicable combination of these factors;

(3) be installed according to limitations specified for that equipment; and

(4) function properly when installed. (See AMC 22.1301(a)(4))

(b) Instruments and other equipment may not in themselves, or by their effect upon the sailplane, constitute a hazard to safe operation.

5.2 CS 22.1365: Electrical Systems and Equipment/Electric cables and equipment

(a) Each electric connecting cable must be of adequate capacity and correctly routed, attached and connected so as to minimize the probability of short circuits and fire hazards.

(b) Overload protection must be provided for each electrical equipment. No protective device may protect more than one circuit essential to flight safety.

(c) Unless each cable installation from the battery to a circuit protective device or master switch, whichever is closer to the battery, is of such power-carrying capacity that no hazardous damage will occur in the event of a short circuit, this length of cable must be so protected or routed in relation to parts of the powered sailplane that the risk of short circuit is minimised. (See AMC 22.1365(c))

5.3 CS 22.1431: Miscellaneous Equipment/ATC airborne equipment

Each ATC airborne equipment provided must comply with the following:

(a) The equipment and its aerials may neither in themselves nor by their mode of operation or by their effect upon the operating characteristics of the sailplane and its equipment constitute a hazard to safe operation.

(b) The equipment and its control and monitoring devices must be arranged so as to be easily controllable. Their installation must be such that they are sufficiently ventilated to prevent overheating.

5.4 EuroCAE ED-73B: Minimum operational performance specifications for secondary surveillance radar mode s transponders

These minimum operational performance specifications are designed to ensure that aircraft Mode S Secondary Surveillance Radar (SSR) transponder equipments certificated to them will be compatible with ICAO Annex 10, Volume IV, Part I up to Amendment 82 and the 1st edition of ICAO Document 9871 (Technical Provisions for Mode S Services and Extended Squitter).

These minimum operational performance specifications do not include detailed descriptions of Mode S coding formats, protocols and interfaces; these can be found in ICAO Annex 10, Volume IV.

6 Weigth and balance

After the change has been performed, a new weight & balance report must be made. This can be performed by either weighing of the aircraft or by calculation.

7 Substantiation of the requirements

7.1 CS 22.1301: Equipment/Function and installation

(a) For each item the following applies:

(1) This Minor Change only covers the installation of ETSO-2C112-approved transponders, such as the Garrecht VT-01 UltraCompact. These transponders are of a kind and design appropriate to its intended design. The antenna Filser Transflex-4 or equivalent will be installed. According to the manufacturer data of the transponders, any suitable antenna may be used.

(2) Transponders with ETSO-2C112-approval are clearly identifiable as transponders. On figure 6 on page 11 it can be seen that commonly used Mode-S transponders in gliders are clearly marked with either “XPDR” or “ATC”. Use, limitations of its use etc. are to be found in the most recent user manual of the relevant transponders.

(3) All installation work will be performed in accordance with acceptable methods, techniques and practices for alternations, inspections and repair as shown in FAA documents AC 43.13.B and AC 43.13-2A and the most recent installation manual of the transponder in question.

(4) After the change is performed, the transponder will be tested in accordance with the instructions of the manufacturer or the transponder in order to verify that the transponder is in compliance with the EuroCAE-ED73B requirements.

(b) Installation of the transponders, antennae and wiring will be so that they will not constitute a hazard to safe operation by themselves or their effect upon the sailplane. In particular, the installation of the antennae and its wiring will be so that no interference with flight controls or other parts of the aircraft is ensured during normal operation of the aircraft. The location of the antenna, and the separation from flight controls, can be seen in figure 5 on page 10. The cable and wires used will be installed according the most recent instructions of the manufacturer of the transponder.

7.2 CS 22.1365: Electrical Systems and Equipment/Electric cables and equipment

(a) The transponder will be connected to the electrical system of the glider according to the latest instructions of the manufacturer of the transponder. These instructions also include a requirement for a fuse, and specify wiring capacities. An electrical diagram can be found on figure 7 on page 11.

(b) Overload protection will be installed according to the latest instructions of the manufacturer of the transponder. This can also be seen on figure 7 on page 11.

(c) Not applicable for this minor change.

7.3 CS 22.1431: Miscellaneous Equipment/ATC airborne equipment

(a) This minor change only covers the installation of ETSO-2C112-approved transponders, which ensures the installed transponder cannot in itself consitute a hazard to safe operation. The aerial is located such that it cannot affect the operating characteristics of the sailplane. Its location can be seen in figure 4 on page 9.

(b) The control devices are all accessible on the instrument panel, such that they are easily controllable. Sufficient cooling is reached by installing the transponder components according to the latest instructions of their manufacturer.

7.4 EuroCAE ED-73B: Minimum operational performance specifications for secondary surveillance radar mode s transponders

After the change is performed, the transponder will be tested in accordance with the instructions of the manufacturer of the transponder in order to verify that the transponder is in compliance with the EuroCAE ED-73B requirements.

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6 Front panel images of commonly used Mode-S transponders in gliders, with their marking hilighted. 11
7 The electrical circuit used to power the transponder. 11

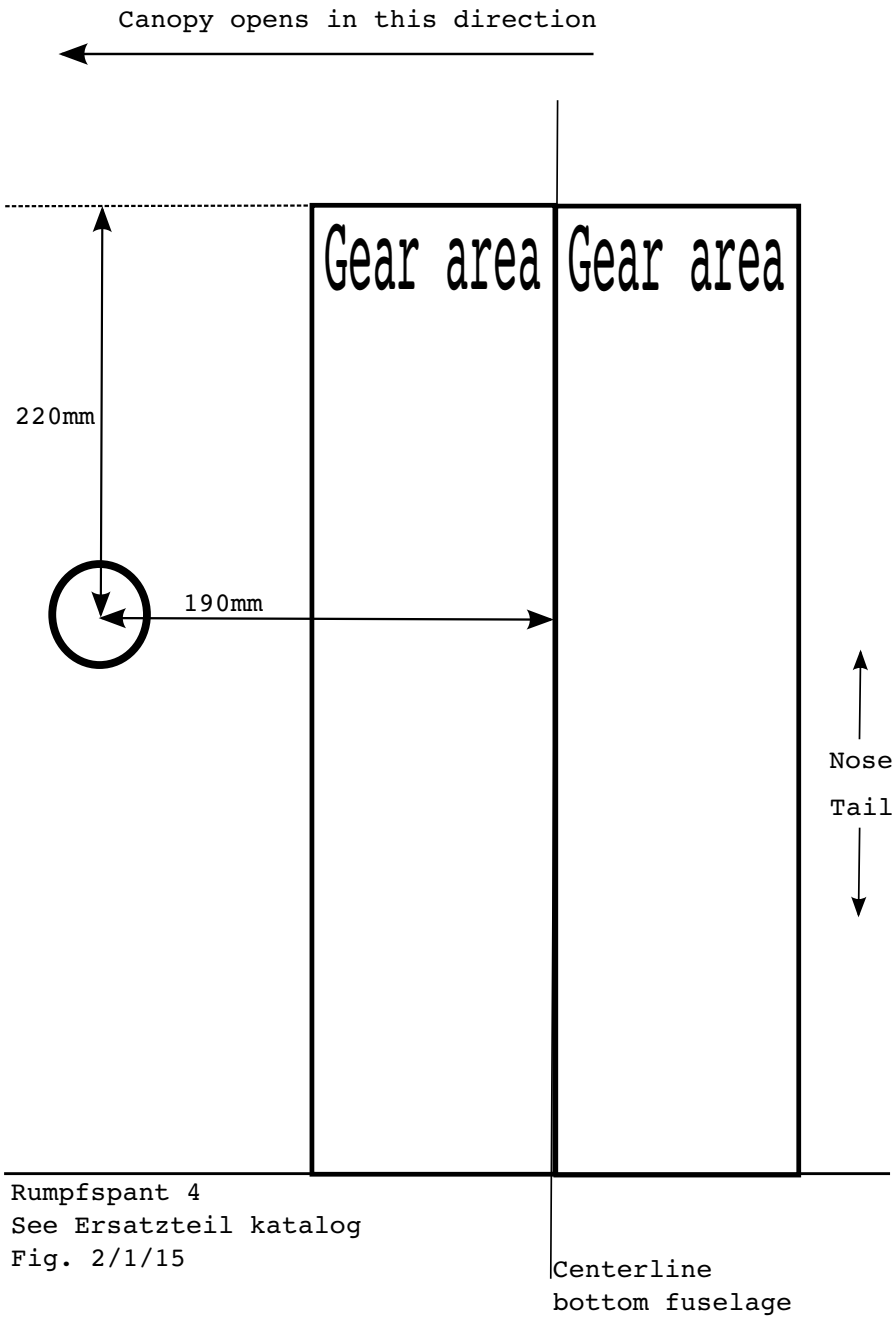


Figure 1: A sketch of the antenna location, relative to Spant 4 and the gear area.

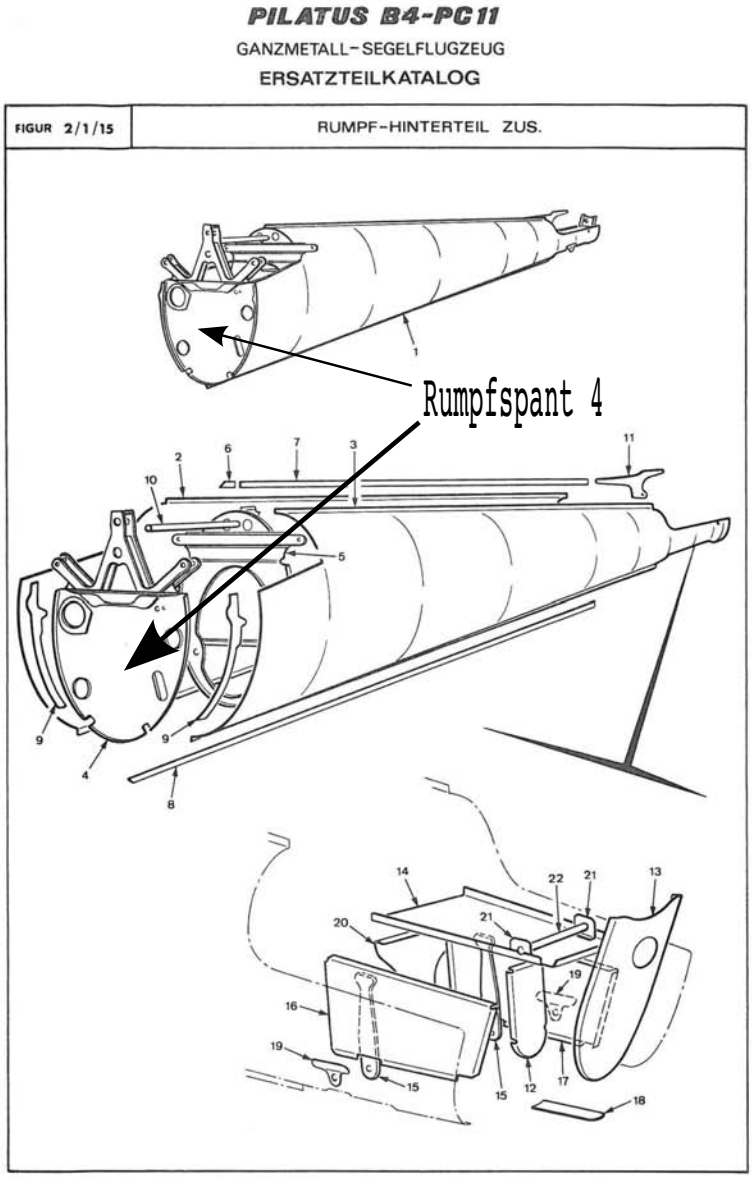


Figure 2: Figure 2/1/15 from the Pilatus PC11-B4 ersatzteil katalog, with Rumpfspant 4 (referenced in Figure 1) pointed out.

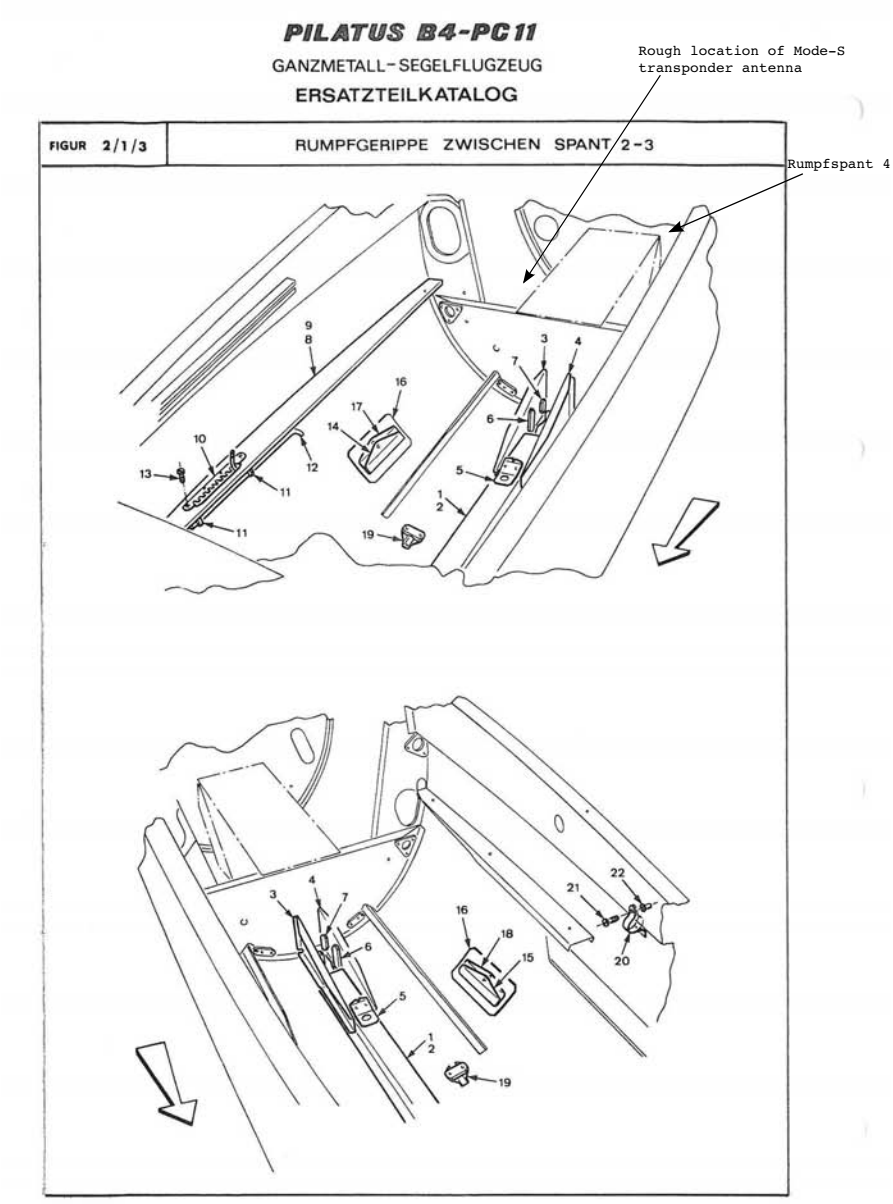
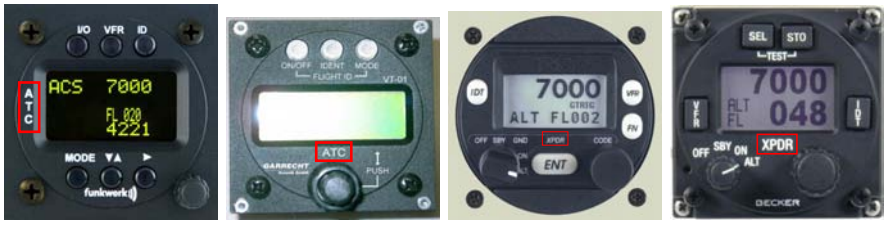


Figure 3: Figure 2/1/3 from the Pilatus PC11-B4 ersatzteil katalog, with the location of the antenna pointed out.

Figure 4: A photograph, taken from the outside of the fuselage, of the antenna installed.

Figure 5: A photograph, taken from the inside of the fuselage, of the antenna installed.



(a) Funkwerk Avionics TRT800 (b) Garrecht Avionik VT-01 (c) Trig Avionics TT-21 (d) Becker Avionics BXP-6401

Figure 6: Front panel images of commonly used Mode-S transponders in gliders, with their marking hilighted.

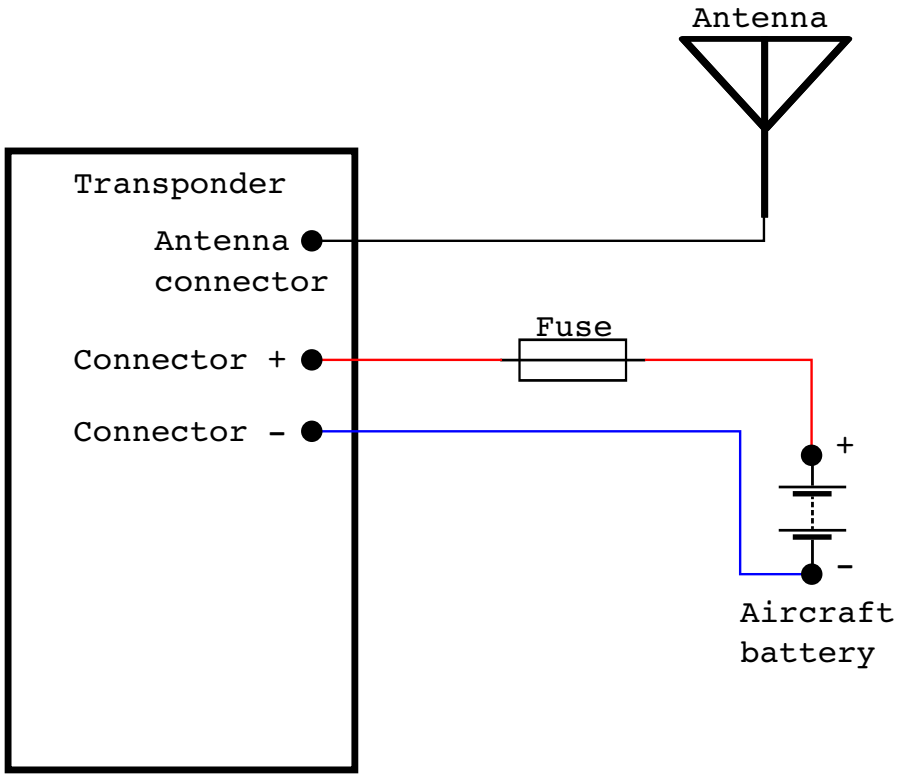


Figure 7: The electrical circuit used to power the transponder.